given under "Local storms." Hail was reported as follows: 1st, Ga., Idaho, Nebr., Nev., Ohio, Oregon, S. C., S. Dak., Va. 2d, Iowa, Mich., Mo., Nebr., Tenn. 3d, Colo., Idaho, Ill., Iowa, Ky., Mich., Minn., Nebr., Nev., N. Y., Ohio, Pa., S. Dak., Tex., W. Va., Wyo. 4th, Iowa, Kans., Mich., Minn., Nebr., N. Y., N. C., Pa., S. Dak., Wis., Wyo. 5th, Ind. T., Iowa, Mich., Mo., N. Y., Ohio, Penn. 6th, Colo., Mich., N. J., N. Y. 7th, La., Tex. 9th, Idaho. 10th, Kans., Pa., Va., Wyo. 11th, Ala., Conn., Ga., Ill., Ind., Iowa, Mo., Mont., N. J., N. Y., Ohio, Pa., S. C., S. Dak., Tex. 12th, Ill., Md., Miss., Pa. 13th, Ill., Ind., Iowa, Kans., Ky., Minn., N. C., S. Dak., Tenn., W. Va., Wis. 14th, Idaho, Ill., Ind., Iowa, Kans., Mo., Nebr. 15th, Colo., Ga., Ind., Iowa, Kans., Nebr., N. Dak., Tenn., Va. 16th, Ark., Colo., Kans., La., Mo., N. J., N. Y., Tenn., Wash. 17th, Colo., Ill., Mich., N. Mex., N. Y., Oregon, Pa., S. C., S. Dak., Wash. 18th, Colo., Idaho, Ind., Iowa, La., Minn., Mo., N. Dak., S. Dak., Wis. 19th, Idaho, Kans., Minn., Mont. 20th, Ind., Minn., Nebr., S. Dak. 21st, Ala., Iowa, Minn., S. Dak., Tenn., Va. 22d, Ill., Iowa, Nebr., N. C., Ohio, Pa. 23d, Minn., Nebr., N. C., Pa., Vt., Va. 24th, Cal., Mont. 25th, Idaho, N. Dak., S. Dak. 26th, Mass. 27th, Idaho, Mich., Nebr., N. Dak., Tenn., Tex. 28th, Cal., Colo., Iowa, Mich., Nebr., N. Y., Ohio, S. Dak., Tenn. 29th, Minn., Miss., N. C., N. Dak., Ohio, S. Dak., Tenn. 30th, Minn., Miss.

SLEET.

Sleet was reported as follows: 4th, Colo. 5th, Pa. 6th, Colo., N. Y. 7th, Colo. 12th, N. Y.

SNOW (snowfall in inches and tenths).

The heaviest monthly snowfall was reported at elevated stations in central Colorado, where a maximum depth of 4.8 fell at La Veta; 3, at Stamford; 2.50, at Breckenridge; and trace, at Box Elder, Colo. In Nevada 3 fell at Ruby Hill, in the east-central part, and 1, at Tuscarora, in the north-central part of the state, and a trace was reported at West Milan, N. H., Cheyenne and Fort Bridger, Wyo.

WINDS.

The prevailing winds during June, 1890, are shown on chart ii by arrows flying with the wind. In New England, the lower lake region, on the northeastern slope of the Rocky Mountains, over the northern plateau region, and along the middle Pacific coast the winds were mostly from northwest to southwest; in the middle Atlantic states, on the middle-eastern slope of the Rocky Mountains, over the southern plateau region, and along the north Pacific coast, from south to west; in the south Atlantic states, from the southwest; over the Florida Peninsula, and in the extreme northwest, from east to southeast; in the west Gulf states, and in the Missouri Valley, from south to southeast; in the Rio Grande Valley, from the southeast; in the Ohio Valley and Tennessee, and along the south Pacific coast, from west to southwest; in the upper Mississippi valley, from southeast to southwest; on the southeastern slope of the Rocky Mountains, from south to southwest; over the middle plateau region from west to northwest; and in the east Gulf states, and the upper lake region, variable.

HIGH WINDS (in miles per hour).

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Signal Service as follows: 1st, 50, n., at Fort Sully, S. Dak.; 59, sw., at Rapid City, S. Dak. 2d, 50, n., at Valentine, Nebr.; 60, n., at Huron, S. Dak. 4th, 50, nw., at Valentine, Nebr.; 66, w., at Fort Sully, S. Dak. 5th, 50, sw., at Memphis, Tenn.; 53, sw., at Chicago, Ill.; 54, sw., at Davenport, Iowa. 6th, 54, ne., at Galveston, Tex. 9th, 76, nw., at Fort Assiniboine, Mont. 10th, 54, sw., at Fort Elliott, Tex. 11th, 50, sw., at Fort Assiniboine, Mont. 13th, 52, se., at Bismarck, N. Dak.; 54, w., at Fort Assiniboine, Mont. 17th, 60, nw., at Detroit, Mich. 21st, 50, w., at Fort Assiniboine, Mont. 22d, 60, se., at Yankton, S. Dak. 23d, 70, se., at Yankton, S. Dak. 26th, 52, s., at Cheyenne, Wyo. 27th, 56, nw., at Fort Buford, N. Dak.; 52, nw., at Valentine, Nebr. 29th, 50, ne., at Chicago, Ill.; 60, n., at Lexington, Ky. 30th, 52, nw., at Columbus, Ohio.

LOCAL STORMS.

On the 2d a thunder-storm prevailed from 6 to 6.30 p. m. at Saint Louis, Mo., during which one person was killed by lightning, a house was struck by lightning and burned, and the operation of electric wires was suspended. In the evening a heavy thunder-storm, attended by hail, occurred at Port Huron, Mich.; 0.51 inch of rain fell in 15 minutes; the wind attained a velocity of 42 miles per hour; a number of buildings were struck by lightning; and trees that were prostrated by the storm appeared to have been twisted off. At Omaha, Nebr., a thunder-storm began at 11.55 p. m., 2d, and ended 3 a. m., 3d, and much damage was caused by high wind and heavy rain. On the 3d an unusually severe thunder-storm, accompanied by high wind and heavy rain, passed over the northern part of Detroit Mich., its path being marked by demolished buildings, prostrated trees, etc. Severe storms were also reported throughout lower Michigan on this date. At Bradshaw, Nebr., a funnel-shaped cloud was observed in the southwest at 7.20 p. m., the funnel of which appeared to reach from the cloud to the earth; it suddenly scattered, and as quickly formed again; anew it scattered and formed, and swinging to and fro, had the form of an elephant's trunk. At this time what appeared a black cloud formed near the ground and assumed the form of an inverted funnel, making the clouds appear like an immense hour-glass; next the depression in the middle filled until the cloud became a solid column from one-third to one-half mile in diameter, in which form it passed over the city. Twelve persons were reported killed and many were injured; the damage done to property is carefully estimated at $108,800, not including loss of live stock. At Glenwood, Iowa, a terrific wind and rain storm advanced from the west at 2 a. m., damaging buildings and blowing down trees. At Dubuque, Iowa, severe thunderstorms, attended by unusually heavy rain, prevailed during the 2d, 3d, and 4th, and two lives were reported lost in washouts on the railroads. The Iowa Weather and Crop Service report states "that on the afternoon of the 4th a number of small but vigorous tornadoes occurred in Adair, Guthrie, Dallas, Boone, Webster, Hamilton, Hardin, Humboldt, and Howard counties, Iowa. The tracks were not continuous, and the tornado clouds arose and descended at intervals, making long jumps between the points of contact with the earth. The first tornado was reported near Adair, Adair Co., about 1.30 p. m., moving in a northeasterly direction; several barns were destroyed; trees were prostrated; wire fences were rolled up in balls, and poultry was stripped of feathers. This storm descended in the vicinity of Dawson, Dallas Co., and Angus, Boone Co., demolishing a large railroad bridge, destroying much property, and injuring many persons. The track of the tornado was traceable through the northern part of Boone county, where considerable damage was done at points where it descended to the earth. At about the same hour a heavy wind storm struck Grant township, Hardin Co., destroying a number of buildings. About 3.30 p. m. a tornado visited Chester township, Howard Co., destroying a school-house in which school was in session, and wrecking a number of farm buildings, without, however, an attendant loss of life. About 4.30 p. m. a small tornado passed between Badger and Vincent, Webster Co., along the Boone River to the vicinity of Renwick, Humboldt Co.; an iron bridge across the Boone River was wrecked; a few farm buildings and some stock were destroyed, and one person was reported killed."

On the 5th a heavy hail storm passed over Huronia Beach, 3 miles north of Port Huron, Mich., from 2.05 to 2.25 p. m.; at the same time a heavy thunder-storm, attended by hail, occurred at Marine City, 18 miles south of Port Huron, and vessels passed through heavy hail storms 15 miles north of Port Huron. In each instance the hail-stones were reported large and irregular in shape. A severe wind storm began at Davenport, Iowa, at 11 a. m., and attained a velocity of 54 miles per hour, causing considerable damage to fruit trees. A thunder-storm, accompanied by heavy rain, occurred at Sault de Ste. Marie, Mich., in the morning, and damage was caused by the flooding of cellars, washing out of streets, etc. On the 7th a severe wind, rain, and hail storm occurred about four miles west of Crowley, La., which flooded a considerable extent of country and damaged crops. A press dispatch from Van Horn, El Paso Co., Tex., stated that a heavy rain and hail storm passed south and north of that place the evening of the 8th. On the 9th a heavy wind storm prevailed at Halifax, N. S., during which vessels dragged their anchors. At Pensacola, Fla., a black, well-defined, funnel-shaped cloud appeared over the bay about 2 miles south-southwest of the city from 7.53 to 8.10 p. m.; it descended at intervals to within several hundred feet of the water, and moved in a northwesterly direction. On the 10th a tornado passed through Will Co., Ill., about 9 p. m., devastating a large strip of country, and killing or injuring a number of persons. Heavy storms also occurred in De Witt and Morgan counties, Ill., in Louisa Co., Iowa, and in Hamilton Co., Ohio. A wind and hail storm damaged crops in Cumberland Co., Pa. Electrical storms were reported in Berks and Erie counties, Pa., at night. Electrical storms occurred in Randolph Co., Mo., and in Essex Co., Mass.; and a wind, rain, and hail storm in Rockingham Co., Va. On the 11th a hail storm occurred near Clifton, S. C., damaging cotton and other crops. Crops were reported damaged by wind and hail in the northern part of Jefferson Co., Ala. At Hartford City, Ind., a destructive wind, rain, and hail storm occurred in the afternoon. At Kokomo, Ind., the storm was the most destructive in years; streets and houses were flooded; great damage was done by hail; and in the country growing wheat was beaten down. A thunder-storm of unusual severity, attended by heavy rain, caused considerable damage at Erie, Pa., in the evening. A heavy thunder-storm, with rain and high wind, occurred at Cincinnati, Ohio, in the evening; the wind attained a velocity of 44 miles per hour, and houses were unroofed and trees prostrated in the surrounding country. A thunder-storm occurred at Saint Louis, Mo., in the afternoon. The first precipitation was in the form of hail without rain. The hail-stones rapidly increased in size as the storm continued, from about one-half inch to two and one-half inches in diameter. The larger stones were irregular in shape and were composed of a sphere of ice about three-fourths of an inch in diameter surrounded by a layer of snow one-eighth to one-fourth inch thick outside of which was a layer of ice of irregular thickness. But little damage was done by the hail.

On the 12th a thunder-storm, attended by heavy rain, small hail, and high wind, passed over Baltimore, Md., in the afternoon. Much damage was caused along the water front, wharves being flooded, and in the country buildings were blown down and crops were injured by hail. A severe thunder-storm occurred at Harrisburg, Pa., causing damage to electric wires. Heavy rain storms occurred in central New York, flooding towns, washing out railroads, and damaging crops. A cloud-burst occurred at Maysville, Ky., at night, causing small streams to overflow, washing away small buildings, and causing washouts on railroads. A thunder-storm passed over Chattanooga, Tenn., in the morning; lightning struck in several places, and damage was done to electric wires. A heavy thunder-storm moving east occurred at Steele, N. Dak., commencing at 1.45 a. m., central time; the lightning was incessant and the thunder very heavy for several hours; no hail fell; no funnel cloud was observed, and there was no evidence that the storm had a whirling motion; a heavy wind commenced at the time the wind-direction changed from southeast to west; there was no period of calm, and objects were carried either ne. or e.; the rainfall was heaviest before the heavy wind. Two storerooms that were tightly closed had windows broken on the north side by a force from within. In one case the window and frame burst out, the frame being about 6 by 12 feet, and in the other one glass 24 by 36 inches was broken. Two patches of gravel roof, one about 10 and the other about 4 feet square were also blown out. The wind at the time was blowing from sw. or w., and continued less than one minute. On the 13th a thunder-storm, attended by high wind and heavy rain, occurred at Logansport, Ind.; hail the size of hickory nuts fell for 20 minutes. At Rockford, Ill., a destructive thunder-storm, with excessive rain, began 8.30 p. m., and continued 3 hours. A thunder-storm, with heavy rain and some hail, occurred at Moorhead, Minn., in the evening; some of the hail-stones were one-half inch in diameter. On the 14th a thunder-storm, with heavy rain and hail, passed over Springfield, Ill., in the evening, the hail-stones being the size of hazel nuts; several washouts were reported on the railroads. At Cadiz, Wis., a thunder-storm began on the 13th and ended on the 14th; the rainfall was excessive, and caused the overflow of streams and flooding of low lands. At Dubuque, Iowa, heavy rain with thunder began 11 a. m., 13th, and continued at intervals until the evening of the 14th, causing considerable damage.

On the 14th a thunder-storm, moving northeast, passed over Monmouth, Ill., about 6 p. m., central time, attended by heavy rain and some hail; the Opera House and Masonic Building were unroofed, entailing a loss of about $800. A heavy thunder-storm occurred at Rock Island, Ill., about 9 p. m., central time. The storm moved southeast, with heavy rain, and buildings, trees, etc., were damaged to the extent of $10,000 to $12,000. At 5 p. m., central time, a tornado, moving northeast, passed 4 to 5 miles north of Monticello, Ill., attended by a heavy fall of hail-stones, some of which were 2½ inches in diameter, but little thunder and lightning, and heavy rain, which was more abundant after the passage of the tornado; large trees were torn up by the roots and others were broken off, and some of the trees were carried nearly 100 feet. A few hundred feet from the storm's path scarcely a breath of air stirred, although much hail fell. A heavy thunder-storm passed southeast over Birkbeck, Ill., at 11.20 a. m., central time, with heavy rain and hail; a school-house was blown down, severely injuring 5 children, and 2 houses and 2 barns were unroofed, the loss to buildings being estimated at nearly $500. A tornado occurred near White Heath, Ill., at 5 p. m., central time. When 3 miles west of that place a funnel-shaped cloud was observed which seemed to descend to the ground when about 1½ mile west of White Heath, where it struck timber and destroyed everything in its path for about 1½ mile, after which it ascended and passed about ¼ mile north of the town; the rain was light before and heavy after the storm, and no hail fell within 5 or 6 miles. On the 15th a severe thunder-storm, with heavy rain and high wind, occurred at Cincinnati, Ohio, in the afternoon; sewers were inadequate to carry off the immense volume of water; some of the streets ran full from curb to curb; street railways were obliged to suspend operations, and the damage to property was estimated at several thousand dollars. On the 16th a thunder-storm, with hail, occurred at Offerle, Kans., the hail-stones being very large. The cloud formed overhead, and passing southeast developed into a tornado in the southeast part of Edwards county, where 2 persons were injured, some stock killed, and buildings were destroyed. At 4.05 a. m. a funnel-shaped cloud passed over Lincoln, Nebr.; the cloud had a whirling motion from right to left, and was attended by heavy rain, more especially after its passage, and damaged property to the value of about $25,000. On the 17th a cloud-burst occurred at Oceola, Pa., at night, doing great damage to railroad and private property, drowning 2 persons, and carrying away stock. A tornado, with large hail and heavy rain, occurred near Lebanon, S. Dak., in the

evening, causing great destruction to buildings and crops. During the storm the Little Cheyenne River rose 25 feet in 30 minutes, drowning 9 persons and destroying considerable property. At 1.50 p. m. a moderate thunder-storm set in at Detroit, Mich., which, however, was attended by the highest wind velocity recorded since the establishment of the Signal Service station at that place in 1870. A velocity of 60 miles per hour from the nw. was registered at 4.21 p. m., and an extreme velocity of 125 miles per hour. The wind gust came and passed with surprising suddenness, causing buildings to tremble as if an explosion had taken place. With the exception of one building in course of erection, which was blown down, the damage done by the storm was slight. At Port Huron, Mich., rain began falling at 2.40 p. m., with loud thunder, vivid lightning, and large hail; the storm was of brief duration. In the surrounding country damage was done to crops by hail, and a number of bridges across small streams were carried away.

On the 18th a severe thunder-storm occurred in the morning at Huron, S. Dak., and heavy rain was reported in the north and west parts of the state. At 4.20 p. m., a thunder-storm, attended by heavy rain and a well-defined whirlwind, occurred at Norfolk, Va.; numerous casualties were reported, and 0.90 inch of rain fell in 18 minutes. Heavy thunder-storms prevailed in Me., and several buildings were struck by lightning. Heavy thunder-storms occurred in southeastern Ky. and the adjoining part of Tenn. A heavy storm, attended in places by hail, passed over Iowa and Vernon counties, Wis., in the evening, and much damage was caused by flooding of small streams. A heavy rain and thunder-storm visited Pleasants Co., W. Va., at night, and a large quantity of lumber was swept away and crops were injured by flooding of small streams. On the 19th a tornado occurred at Boiling Springs, S. C. The cloud was funnel-shaped, and timber and crops were destroyed in its path. At the beginning the path was 20 to 30 feet wide, but as the storm progressed it grew wider. Lands were badly washed by heavy rain attending the tornado. Severe electrical storms, attended by heavy rain and high wind, prevailed at night in northeastern Kans. and western Mo. At Atchison, Kans., great damage was caused by flooding of streets and cellars, and in the country small streams overflowed, sweeping away bridges, etc. On the 20th a tornado passed over Lee Co., Ill., about 3½ miles south of West Brooklyn, about 4 p. m. It consisted of a funnel-shaped cloud, the top of which appeared nearly a mile wide; the portion extending to the ground was inky black, and clouds were rushing from all sides toward the funnel. The clouds revolved with great rapidity in a direction contrary to the movement of the hands of a watch, and buildings near the north edge were carried west from their foundations. On each side of the track objects mowed down by the storm were leaning towards the centre, while 10 to 15 rods farther from the track no damage was caused. Twelve persons were reported killed, and the loss to property was estimated at $200,000. A tornado was reported west of Cornell, Livingston Co., Ill., in the afternoon; its path was about 80 rods wide and 4 miles long; several persons were injured, and every object in its path was wrecked or injured. About 5 p. m., central time, a tornado passed through Lodge, Piatt Co., Ill. A funnel-shaped cloud was seen; the rainfall was light, more rain falling after than before the passage of the tornado cloud; no hail fell; and chain lightning was observed, with but little thunder. The storm moved east with a whirling motion and attended by a roaring sound; small buildings were torn to pieces; trees in the centre of the path fell to the east; no persons were killed or injured, and the loss to buildings was about $500. On the 22d a thunder-storm, with vivid lightning and heavy rain, occurred at Baltimore, Md., in the evening; heavy rain caused injury to crops, and a number of buildings were struck by lightning in the surrounding country. A thunder-storm of unusual severity visited Boone Co., Ill.; railroad tracks were washed out, and a heavy hail storm caused considerable damage a few miles north of Belvidere, Ill. The heaviest rain storm in many years occurred at Carson, Iowa, doing an immense amount of damage to crops, etc. At night a hail storm occurred at Logan, Iowa, which damaged fruit, grain, etc., and heavy rain flooded lowlands along the Boyer River. A tornado passed through Sweetwater, Nebr., at 3.20 p. m.; the cloud formed in the southwest, with thunder and lightning, about 1 hour before it assumed a funnel shape; it then seemed to twist and turn, and objects in its path seemed to fall in every direction; a number of persons were injured, and the damage to property was estimated at $25,000. A severe electrical storm swept over Omaha, Nebr., between 8 and 9 p. m.; much damage was caused by heavy rain; and 1 person was killed, and several houses were struck by lightning. The storm was also very severe at South Omaha, Nebr.

On the 23d a violent storm passed over Dayton, Ky., at 6 p. m., damaging property to the amount of about $18,000. A severe thunder-storm, with heavy wind, rain, and hail, visited the Juniata Valley, Pa., in the afternoon, doing much damage to crops in Huntingdon county. On the 24th an unusually heavy rain storm occurred at Fayette, Iowa; great damage was caused to crops, and roads and railroads were washed out. Destructive hail storms were reported in Colusa Co., Cal. On the 27th a tornado was reported in the eastern part of Washburn Co., Wis., in the afternoon, which caused much damage to buildings, trees, and crops. At Marquette, Mich., a thunder-storm, with heavy rain, began 12.30 a. m. and ended during the night, causing washouts. At Fort Buford, N. Dak., a heavy thunder-storm began 1.22 p. m.; heavy rain fell; the wind attained a velocity of 56 miles per hour. In the Yellowstone Valley, 25 miles sw. of Fort Buford, a heavy hail storm occurred, which destroyed vegetation and caused other damage. On the 28th a storm passed over Portland and Orange, Ionia Co., Mich., causing great damage to timber and crops. At Detroit, Mich., a severe thunder-storm occurred in the morning, during which several houses were struck by lightning, and at 2.15 p. m. an unusually severe thunder and rain storm, with high wind, set in; some damage was done by the wind, and a man was killed by lightning. On the 29th an electrical, rain, and wind storm occurred at Sheffield, Ala. On the 30th a heavy thunder-storm, with heavy rain, occurred at Columbus, Ohio, in the evening; a number of persons were stunned and two were killed by lightning. A heavy electrical storm began at Wheeling, W. Va., about 5 p. m., and lasted one hour; the storm advanced from the southwest, and the heavy rainfall flooded streets in the lower part of the city.

Akron, Ohio, Tornado of May 10, 1890.

The following is a corrected report of the Akron, Ohio, tornado of May 10, 1890, furnished the Ohio Meteorological Bureau by Prof. H. V. Egbert, Buchtel College, Akron, Ohio:

The tornado struck the southwest limit of the city and continued its course in a direction N. 60° E. for a distance of 2 miles, and again lifted at the eastern limit of the city to do no more damage for a distance of 5 miles, when it unroofed a barn and uprooted a few trees. Quantities of tarred paper, probably carried from Akron, were found at a distance of 10 miles. The path through Akron was slightly curved, being concave on the north or left side, and exhibited slight irregularities. The width of the path of greatest destruction varied but little from 50 feet, though trees were prostrated in a path up to 250 feet in width. The lowest estimate of its rate of progress was 50 miles an hour. I saw it only during one-fourth of a mile of its course, and being occupied, did not notice its duration of visibility, but an estimate made immediately afterwards placed it at 4 seconds. This makes a rate of 225 miles per hour. This seems an extreme one, but in the absence of any definite knowledge is perhaps as reliable as any other estimate. The tornado passed about the middle of its path at 4.54 p. m., central time. Several observers report seeing two clouds come together, one from nw. and the other from sw., and that after meeting they began to whirl and bore down upon a house in the outskirts of the city, which was the first thing injured. This house was completely ruined, only the floor and parts of the sides remaining near, the rest, including furniture, being carried away. After leaving this house the tornado did no serious damage for some distance. This character attended the tornado throughout its course; serious damage would result for some distance, then little or none for some distance further. Some of the observers state that the cloud lifted at times and passed over the house tops. Besides the house first spoken of four houses were entirely destroyed, being carried from their

foundations and literally mashed to pieces. Three of these seemed to have been pushed off their foundations in the direction of the storm's progress and mashed, while the fourth was rolled over, as shown by marks on the ground, and the fact that the floors were upside down. Another house was rolled over on its side and left intact.

To sum up, 5 houses were completely demolished; 8 barns were completely destroyed, and 1 rolled over; 14 houses were moved from their foundations, some only a few inches, and others 10 to 12 feet; in two cases houses fell towards each other; 2 barns were displaced; the east side of one house was torn out, probably owing to the fact that it had a square front rising above the roof; 10 houses and 2 barns were unroofed to a greater or less extent; a large pottery, south of what appeared to be the path of the tornado, had its roof torn off and carried nearly in the direction of the storm's progress; the top of the brick wall of the pottery was injured somewhat, but the north end of the building was torn out, the upper bricks being thrown a distance of 15 feet, the lower ones not so far. The appearance was that some force had pushed the wall over, while shelving immediately inside was intact. This may have been an explosion, as I could not conceive of any way in which the departing roof could give the wall such an outward shove. All prostrations of trees in the immediate path of the storm were in the direction of the storm's progress, as nearly as could be expected, considering the unequal resistance by the different roots of a tree, and by the shape and size of houses. Objects outside the path were prostrated in general toward the path and, roughly, at right angles to it. In some few cases the prostrations were almost exactly the opposite of this, and I have noticed, chiefly on the north side, that some of the trees were prostrated to the n. and nw. In no case have I found that a tree moved after it struck the ground; they were simply pushed over, one-half the roots being pulled out of the ground, the other half remaining firmly in the ground. In the midst of fallen trees are others standing, some showing by openings in the ground, at one side, that they had experienced strong wind, while others, apparently under the same conditions, show no such evidence.

Of the material carried forward by the storm very little was left over 150 feet from the main line of the storm. Timbers and boards were left lying almost entirely lengthwise of the storm's path. Two cases are reported where south cellar doors of houses north of the storm's path were blown open. In shape the tornado cloud has been very generally described as a cone, though by no means regular in its outlines, nor do the cones described agree in shape, as they vary from the conventional cone of geometry, with wide base, to the pineapple cone. Observers state that the cloud column was not a solid column of cloud, but was made up of detached, fragmentary cloud masses. All report that the motion was counter-clockwise. Two observers saw the tornado cross streets, and using width of street as a unit of measure, the base of the cloud column had a diameter of 40 to 50 feet. Many report that its passage was attended by a noise resembling that made by a train of cars. The general conditions of the weather were: a large cloud overspread the sky from the southwest, and the wind was from the same quarter and very light. I was one-fourth of a mile north of the tornado when it passed, and there was no perceptible breeze. Inside of a minute after it passed a sharp breeze sprang up from the northwest, which died out in a short time. The lightning in the general storm was mild, and observers say that there was none in the cloud column. No hail was reported. Rain was not excessive and apparently did not change in quantity after the tornado passed. After the wind changed to northwest the clouds began to break, and the late evening was almost entirely clear. It is difficult to decide upon which side of the track the force of the storm was greater. The total amount of damage is estimated at about $80,000. No lives were lost; three persons were seriously and several slightly injured.

INLAND NAVIGATION.

FLOODS.

The Mississippi River fell below the danger-line at Vicksburg, Miss., on the 3d, and at New Orleans, La., on the 12th. Large areas of swamp and low land in southeastern and southern La., and tracts of land in the river parishes as far north as Madison parish, La., were under water during the month. In the early part of the month melting snow in the Sierra Nevada Mountains caused the Carson River to overflow its banks, and thousands of acres of land in Ormsby and Douglas counties, Nev., were inundated. Advices dated the 7th state that great damage was caused by floods in Ontario, Canada. Railroads and dams were washed out; buildings and bridges were swept away; and much live stock was drowned. Reports of the 12th state that great damage was caused by floods in central N. Y. Large quantities of lumber and buildings were washed away by the overflow of streams, and traffic on railroads was delayed by washouts. On the 13th rivers and streams in northern Ill., and southern Wis. were overflowing their banks. At Rockford, Joliet, Elgin, Dixon, Aurora, and other places in northern Ill., great damage was done to property, and southwestern Wis. was largely inundated.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the several stations; the highest and lowest water during June, 1890, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, June, 1890 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.	29.9	1	23.3	30	11.7	11.6
Arkansas River:						
Fort Smith, Ark.	22.0	5	11.2	22	2.3	8.9
Little Rock, Ark.	23.0	8	13.7	25	6.2	7.5
Missouri River:						
Ft. Buford, N. Dak.	.....	7	12.3	13	7.8	4.5
Sioux City, Iowa	.....	7	13.5	18	9.1	4.4
Omaha, Nebr.	18.0	9	12.9	1	8.4	4.5
Kansas City, Mo.	21.0	11	17.2	1	8.9	8.3
Mississippi River:						
Saint Paul, Minn.	14.5	23	7.0	1	3.7	3.3
La Crosse, Wis.	24.0	15	9.7	1	7.4	2.3
Dubuque, Iowa	16.0	26	14.2	1	7.0	7.2
Davenport, Iowa	15.0	29	11.7	1	4.4	7.3
Keokuk, Iowa	14.0	30	12.6	1	4.1	8.5
Saint Louis, Mo.	32.0	30	20.7	3,4	11.6	9.1
Cairo, Ill.	40.0	1	33.1	12	21.4	11.7
Memphis, Tenn.	34.6	1	26.3	15	17.4	8.9
Vicksburg, Miss.	41.0	1	41.3	30	28.9	12.4
New Orleans, La.	13.0	1, 2, 3	13.7	30	10.7	3.0
Ohio River:						
Pittsburgh, Pa.	22.0	22	8.5	30	2.3	6.2
Parkersburg, W. Va.	38.0	22	16.2	14	6.0	10.2
Cincinnati, Ohio	50.0	1	37.5	10	16.0	21.5
Louisville, Ky.	25.0	1	14.8	10	7.2	7.6
Cumberland River:						
Nashville, Tenn.	40.0	1	17.1	30	3.3	13.8
Tennessee River:						
Chattanooga, Tenn.	33.0	1	6.1	30	3.1	3.0
Monongahela River:						
Pittsburgh, Pa.	29.0	22	8.5	30	2.3	6.2
Savannah River:						
Augusta, Ga.	32.0	4	9.4	30	6.1	3.3
Willamette River:						
Portland, Oregon	15.0	1	17.6	29, 30	12.4	5.2

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were reported as follows: 7th, Lyons, N. Y. 8th, Carson, Iowa; Quakertown, Pa. 19th, Quakertown, Pa.

THUNDER-STORMS.

The more severe thunder-storms of the month are described under "Local storms." East of the Rocky Mountains thunder-storms were reported in the greatest number of states, 30 to 34, on the 5th, 6th, 11th to 15th, 18th, and 23d; in 20 to 29 on the 1st, 3d, 4th, 7th, 9th, 10th, 16th, 17th, 19th to 22d, and 24th to 30th; in 19 on the 2d; and in 14 on the 8th.

East of the Rocky Mountains thunder-storms were reported on the greatest number of dates, 30, in Fla., N. C., and Tenn.; on 20 to 29 in Ala., Ga., Ill., Ind., Iowa, Kans., Ky., La., Mich., Minn., Miss., Mo., Mont., Nebr., N. Y., N. Dak., Pa., S. C., S. Dak., Tex., and Wis.; on 10 to 19 in Ark., Md., Mass., N. H., N. J., R. I., Vt., Va., and W. Va.; and on 1 to 9 in Conn., D. C., Ind. T., Me., and S. C. West of the Rocky